

CVOC Historical Case Analysis Initiative Plume Screening Checklist

The purpose of this Initiative is to evaluate the extent and behavior of chlorinated volatile organic compound (CVOC) groundwater plumes and, depending on the outcome of the data analysis, provide project managers with a tool to aid in decision making. Our working hypothesis is that the attributes of chlorinated solvent plumes, such as plume dimensions (length, width, thickness) and plume growth, have natural groupings. By identifying these natural groupings and data necessary for site evaluation, this document should help project managers to collect the appropriate data. This in turn should be an aid to the CVOC cleanup decision making process.

During 1997, the Initiative Data Collection Team will be collecting data on CVOC plume behavior. This screening checklist is intended to identify plumes that will be "nominated" for more in-depth data gathering. Plumes that qualify for the study must have sufficient data on fundamental factors such as advection, dispersion, sorption, and degradation.

This CVOC Plume Screening Checklist is intended to guide a case reviewer in determining if sufficient data is available to include a plume in the historical case analysis. The Plume Screening Checklist identifies key data requirements that must be available for a plume to be nominated for further evaluation. Nominated plumes will be reviewed by the Initiative Data Collection Team, who will complete a more extensive data collection checklist, and gather the data that will be entered into the historical case analysis database.

Site Location, Points of Contact, and Reviewer

This information is needed to identify the location of the plume and participant organization points of contact who performed the screening. In addition, the information is needed to identify points of contact for the responsible party and site consultant to facilitate electronic data gathering.

Key Screening Questions

These questions are placed early in the check list, so a person reviewing a given plume will not waste time on plumes that are not useful. If the answers are "yes" to these key questions, then it will be worthwhile to continue with the checklist.

Explanation of Checklist Sections

The CVOC Plume Screening Checklist is divided into ten sections. Each section is intended to provide important information needed to perform the plume data collection process.

1. Site Description and History

Sites that have inadequate or no written site description or release history are excluded.

2. Chemicals of Concern

The major CVOCs of concern are carbon tetrachloride (CT), tetrachloroethene (PCE), trichloroethene (TCE), 1,1,1-trichloroethane (TCA), 1,1,2-tetrachloroethane, and their CVOC daughter products chloroform (CF), methylene chloride (MC), cis- and trans-1,2-dichloroethene (cis-DCE, trans-DCE), 1,1-dichloroethene (1,1-DCE), vinyl chloride (VC), 1,1-dichloroethane (DCA), chloromethane, 1,2-dichloroethane (1,2-DCA), dichloromethane, and chloroethane (CA). Sites which do not have one of these CVOC compounds as the primary contaminant are eliminated.

3. Extent and Duration of Groundwater Monitoring

Ideally, this study would only use data from sites where no plume remediation activities have been implemented. This is because remediation activities have great impacts in altering plume behavior, which of course is their purpose. However, excluding these sites would severely limit the universe of sites eligible for the study. On the other hand, there are many sites that do have several years of groundwater monitoring data prior to implementation of groundwater remediation activities. This study will draw sites from both of these categories using the following screening criteria:

- *Concentrations of one or more CVOCs of interest (e.g., PCE, TCE) have exceeded 10 ppb in a number of plume wells.*
- *A meaningful plume length (distance from source area to downgradient leading edge) may be defined.*
- *Data are available prior to active remediation measures. This refers to any engineered attempt to influence the contaminant plume in the aquifer (exclusive of source area remediation).*
- *The primary contaminant plume does not daylight into surface water bodies before the 10 ppb contour.*
- *The CVOC groundwater monitoring analytical data are available in electronic form.*
- *There are measurements of hydraulic conductivity, and of the (x,y) coordinates of the groundwater monitoring wells at the site.*

4. Site Hydrogeology

Advection is one of the key processes that influence plume behavior. Sites which have not measured either groundwater flow velocity directly or taken measurements of hydraulic gradient, and hydraulic conductivity such that a groundwater flow velocity can be estimated, are eliminated. The hydrostratigraphy of a site is also an important influence on plume behavior. Sites where boring logs and/or cross-sections are not available are also eliminated. Optional information includes lithology and organic carbon classification of the site. This information will be used to ensure that a variety of lithologies and organic carbon conditions are represented.

5. Identification and Magnitude of Source and Release(s)

The location and characterization of the source are important to understanding how plumes behave. Sites where the approximate location of the source has not been identified are eliminated. Optional information regarding the nature of the source is requested so that the Initiative Data Collection Team can select sites that represent a variety of source conditions.

6. Groundwater Chemistry and Contaminant Fate

Groundwater analytical data on general minerals, biodegradation geochemical indicator compounds, and potential carbon sources are key in understanding natural attenuation process that are dominant within a given hydrogeologic setting. However, this data has only been collected at a minority of sites. The Initiative Data Collection Team will be interested in sites where this data has been collected and/or studied.

7. Plume Dimensions and Behavior

This optional information regarding plume dimensions and behavior is requested so that the Initiative Data Collection Team can select plume sites that represent a variety of sizes. This study will attempt to draw sites representing the wide range of plume sizes that occur in the United States. For example CVOC plume lengths can vary over four-orders-of-magnitude, from 10's to 10,000's of feet in length.

8. Remediation Activities

This optional information regarding remediation activities is requested so that the Initiative Data Collection Team can select sites with the longest period of pre-groundwater remediation monitoring. In addition, many CVOC plumes have had primary source removal either by actual physical removal of a leaking tank, excavation of a disposal area, or by hydraulic control of the secondary source area, without necessarily exercising hydraulic control on the distal portion of the plume. These sites will not be excluded from the study.

9. General Comments on Suitability of Site for Inclusion in Study

This is a general question that allows personal comments that might not be obvious to the Initiative Data Collection Team. Since the person filling out the plume screening checklist is expected to be an individual with a good understanding of the site, they may have comments, opinions, or anecdotal information that could be helpful in the nomination and screening process.

10. Data Requested in Electronic or Paper Form

This is a listing of the data that is being requested. It is preferred that as much of the data be in electronic form as possible. The most important data are the CVOC groundwater monitoring well analytical chemistry data and the (x,y) coordinates for the monitoring wells. The groundwater analytical chemistry data for the CVOCs and other analytes must be in electronic form. It is preferred that the (x,y) coordinates also be in electronic form, although this is not a requirement. All other data is acceptable in paper form.

Chlorinated VOC Plume Screening Checklist

Site Location, Points of Contact, and Reviewer:

Site name: _____
Alternate site names (aliases): _____
City: _____
State: _____
Zip code: _____

Agency project manager: _____
Agency name _____
Street Address: _____
City: _____
State: _____
Zip code: _____
Phone number: _____
Email (if available) _____

Person filling out this form: _____
(if other than project manager)
Associated agency: _____
Street Address: _____
City: _____
State: _____
Zip code: _____
Phone number: _____
Email (if available) _____

Consultant name: _____
Company name: _____
Street Address: _____
City: _____
State: _____
Zip code: _____
Phone number: _____
Email (if available) _____

Responsible Party Contact: _____
Company: _____
Street Address: _____
City: _____
State: _____
Zip code: _____
Phone number: _____
Email (if available) _____

Date this form completed: _____

Key Screening Questions:

- Are the most significant chemicals of concern in groundwater at this site any of the following CVOCs: carbon tetrachloride (CT), tetrachloroethene (PCE), trichloroethene (TCE) , or 1,1,1-trichloroethane (TCA), or their daughter CVOC products [(i.e., chloroform (CF), methylene chloride (MC), cis- and trans-1,2-dichloroethene (cis-DCE, t-DCE), 1,1-dichloroethene (1,1-DCE), vinyl chloride (VC), 1,1-dichloroethane (DCA), or chloroethane (CA)]? yes no
- Have the concentrations of one or more CVOCs of interest (e.g., PCE, TCE) exceeded 10 ppb in a number of plume wells? yes no
 - Can a meaningful plume length (distance from source area to downgradient leading edge of 10 ppb) be defined? yes no
 - Are data available prior to active remediation measures.? This refers to any engineered attempt to influence the contaminant plume in the aquifer (exclusive of source area remediation). yes no
 - Is the CVOC groundwater monitoring analytical data available in electronic form? yes no
 - Are the (x,y) coordinates of the groundwater monitoring wells known? yes no

IF THE ANSWER TO ANY OF THE ABOVE QUESTIONS IS NO, DO NOT FILL OUT THE REMAINDER OF THIS FORM.

Electronic Data:

The CVOC groundwater monitoring analytical data in electronic form is a minimum requirement. The electronic data may be provided in any format that is convenient. The preferred formats are MS ACCESS tables or databases, Excel spreadsheets, tab-delimited text files, or MS Word documents, and any electronic version of site maps in AutoCAD (.DWG or .DXF) or ArcView/ArcINFO (.shp or .e00) formats. The data can be mailed on 3.5 inch PC-compatible disks, ZIP disks, or sent via internet by individual arrangement. Internet transmission is preferred.

Please list the content and format of the electronic data available for this site:

3. Extent and Duration of Groundwater Monitoring (cont.)

- 3.5 Has groundwater remediation commenced? yes no
 If yes:
 Number of years monitoring wells were sampled prior to initiation of groundwater remediation: _____
 Number of sampling events prior to initiation of groundwater remediation: _____
 Number of years monitoring wells were sampled after groundwater remediation was discontinued: _____
 Number of sampling events after groundwater remediation was discontinued: _____
- 3.6 Has the plume been monitored or sampled with depth-discrete sampling methods? yes no

4. Site Hydrogeology

- 4.1 Are there multiple geologic units? yes no
 4.1a Provide a brief description of the site geology _____

- 4.2 Are there measurements of:
 hydraulic gradient? yes no
 porosity? yes no
 hydraulic conductivity in the plume? yes no
- 4.3 Are there boring logs available? yes no
 Are depth of hydrostratigraphic contacts at boring location available? yes no
- 4.4 Have the well elevations and locations been surveyed? yes no

5. Identification and Magnitude of Source and Release(s)

- 5.1 Have the source location(s) been approximately identified? yes no
- 5.2 Are there multiple CVOC source areas? yes no
 5.2a If yes, do the primary CVOC plumes co-mingle? yes no
 5.2b If yes, can their lengths still be defined at the 10 ppb contour? yes no

6. Groundwater Chemistry and Contaminant Fate:

6.1 Which of the following plume general minerals, biodegradation geochemical indicators compounds, and potential carbon sources were measured? (check)

- | | |
|--------------------------|----------------------------|
| Alkalinity | Iron, dissolved or Fe(II) |
| Ammonia | Manganese |
| Carbon dioxide (CO2) | Methane |
| Chloride | Nitrate/nitrite |
| Dissolved organic carbon | pH |
| Dissolved oxygen (O2) | Phosphate |
| Ethane | Redox potential (Eh or pE) |
| Ethene (ethylene) | Specific Conductivity (EC) |
| Fatty acids | Sulfate |
| Hydrogen (H2) | Sulfide |
| Other _____ | Temperature |

6.2 Were any natural attenuation or biodegradation studies performed at the site? yes no
 If yes, describe:

7. Plume Dimensions and Behavior:

7.1 Has the CVOC groundwater contaminant plume been contoured? yes no

7.2 Are there any indications of any special conditions that are affecting plume behavior, (e.g. sewer and water lines, or sumps)? yes no
 If yes, describe

7.3 Is the primary CVOC plume daylighting into a river or lake, and truncating before the 10 ppb contour is reached? yes no
 If yes, describe

7.4 Are there pumping wells, which distort the plume, and interfere with natural plume behavior? yes no
 If yes, describe

8. Remediation Activities:

8.1 Have soil, groundwater, or vapor removal activities been performed in source area? yes no
If yes, describe

8.2 Have plume groundwater remediation activities been performed? yes no
If yes, approximate date remediation began _____
If yes, approximate date remediation was discontinued _____

8.3 Short description of remediation activities (i.e., cycling, multiple methods, etc.)

9. General Comments on Suitability of Site for Inclusion in Study:

10. Listing of Requested Data:

Check if Available in Paper or Electronic Form *{electronic is preferred}*:

10.1 Site Investigation Data

- | | | |
|-------|-------------------------------------|---|
| paper | elec. | |
| _____ | <input checked="" type="checkbox"/> | Groundwater sample analytical data from each well through time (including CVOCs, minerals, etc) <i>{electronic is required}</i> |
| _____ | _____ | Groundwater elevation & depth to groundwater measurements through time |
| _____ | _____ | (x, y) coordinates for wells (lat, long) |
| _____ | _____ | DNAPL/LNAPL analytical data |
| _____ | _____ | Soil & groundwater test data (porosity, bulk density, moisture, toc) |
| _____ | _____ | Aquifer pumping test results (i.e., transmissivity, conductivity) |
| _____ | _____ | Boring logs, geologic description logs |
| _____ | _____ | Well construction logs (screen depths) |

10.2 Maps and Cross Sections

paper	elec.	
_____	_____	Regional site location map
_____	_____	Site maps showing physical features (topography, roads, sewerlines, drains)
_____	_____	Site maps showing monitoring well locations, and boring locations
_____	_____	Site maps showing source locations
_____	_____	Site maps showing groundwater elevation contours
_____	_____	Map of nearby wells and surface water bodies
_____	_____	Isocontour maps of COCs in groundwater
_____	_____	Isocontour maps of COCs in soil
_____	_____	Site maps showing locations of SVE wells & groundwater extraction wells
_____	_____	Geologic maps and cross-sections along and normal to axis of plume core

10.3 Narratives:

_____	Site Description
_____	Site Geology
_____	Release History
_____	Site Investigations (summary, if available)
_____	Remediation History

***Hard Copy Data:**

Typically, an RI/FS will provide this information on site history, site description, and site characterization documents.

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